

Remarks/Arguments

Amendments to the Claims

Claims 1 and 17 have been amended to recite that the reservoir is external to the main valve body. Claim 17 has also been amended to add the word “solely” to further clarify the principle of operation of the springless design of the pressure relief valve. Claim 25 has been amended in response to the Primary Examiner’s comments in action number 5, “In claim 25, “wedge” is being regarded as a mere identifier.” ‘Wedge’ is not a mere identifier in Claim 25, but it is a structural limitation referring to the shape of the ring. In order to clarify this, Claim 25 has been amended to specifically recite the wedge shape of the wedge ring. The amendments only clarify the structural arrangement of previously claimed structural elements and do not introduce any new matter, and do not necessitate an additional search. For reasons of efficiently prosecuting the present application, entrance of the amendments is courteously requested.

Claims 1-6, 8-12, 14, 16-22, 24 and 25 rejected under 35 U.S.C. 102(b) as being anticipated by US Patent Number 6,220,280 (Lai), or, in the alternative, under 35 U.S.C. 103(a) as obvious over Lai in view of US Patent Number 3,913,885 (Greenwood et al.)

The Primary Examiner rejects Claims 1-6, 8-12, 14, 16-22, 24 and 25 under 35 U.S.C. 102(b) as being anticipated by Lai, or, in the alternative, under 35 U.S.C. 103(a) as obvious over Lai in view of Greenwood et al. Applicants respectfully traverse the rejection.

“A claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described in a single prior art reference.” *Vandergaal Bros. v. Union Oil of California*, 814 F.2d 628, 631; 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). MPEP §2131. (Emphasis added). Each and every element of the claims is not found either expressly or inherently described in Lai. The Primary Examiner states in item 5 of the Office Action of January 10, 2007 that Lai discloses dome reservoir (16), but Lai discloses “a pilot valve 16 for operating the relief valve 14”. Lai Column 2, lines 48-49. Component 16 **is not** a reservoir as defined in the present application. Additionally, independent Claims 1 and 17 recite a springless dome reservoir whereas Lai describes spring components (see elements 66 and 84 of Lai). It should be appreciated that it is well known in the art that pilot valves comprise springs, and that the present invention does not require springs or a pilot valve.

Additionally, Claim 17 recites, “exerting a downward force on said piston, wherein said downward force is generated solely by a second fluid in a dome reservoir connected to said relief valve, and wherein said dome reservoir is springless”. The downward forces exerted onto the pistons described in both Lai and Greenwood et al. are provided substantially by springs. Thus, contrary to the limitations recited in Claim 17, Lai does not describe a springless dome reservoir or a downward force generated solely by a second fluid in the dome reservoir.

Claim 1 recites: “a dampening ring positioned circumferentially about said piston and operatively arranged to dampen movement of said piston”. Claim 17 recites equivalent language: “dampening movement of said piston by means of a dampening ring positioned circumferentially about said piston.” Lai fails to disclose a means for dampening the movement of a piston in a relief valve. Lai teaches “[s]uitable seals **62**...mounted in annular grooves about the piston **58** and ride in sealing relationship with the bore **54** as the piston **58** moves within the bore **54**.” Lai, Column 3, lines 17-20. Seals **62** do not provide any means of dampening the movement of the piston to reduce the likelihood of rapid piston movements or oscillations and provide only a “sealing relationship”. Seals **62** in Lai are arranged so as to provide minimal frictional contact between the piston and the bore. This can be noted for two reasons. Firstly, seals **62** have a circular cross section, thereby minimizing surface contact between the seals and the bore, and allowing the seal to “roll” instead of slide. Seals of this shape can roll if the frictional force of sliding the seal against the respective surface contact points is greater than the force required to roll the circular body along the direction of movement of the piston. Secondly, there is a substantially large gap atop and below seals **62**. These gaps are part of the notch in which seals **62** reside. The gap allows for seals **62** to have a sliding contact with the bore while frictionally secured to the piston. This creates less friction between restricting piston movement, especially if the seals begin to roll. With this large gap, the seals can roll a substantial distance, causing the piston to chatter very easily because seals **62** are not structurally arranged to provide the dampening described in Claims 1 and 17 of the present application.

Furthermore, applicants courteously request the Primary Examiner’s attention to wear ring **313** of Figure 3 and paragraph [0013] of the instant application, wherein “[t]o prevent metal-to-metal contact and possible scoring between piston **60** and liner **58**, wedge ring **312** and wear ring **313** are fit into shallow grooves in the piston that allow the outboard surface of each ring,

and not the outside surface of the piston, to slide against the liner bore as the piston moves up and down” and to paragraph [0015], wherein “[p]iston seal **310**, an elastomeric O-ring, provides the pressure- and leak-tight seal between piston **60** and liner **58**. A PTFE back-up ring **311** is designed to give the O-ring support and prevent excessive deflection of the O-ring into the gap between metal parts **58** and **60**.” Lai discloses suitable seals **62** and applicants disclose seals through ring **311** and ring **313**, but applicants further disclose another ring, wedge ring **312**, which provides means of dampening the movement of the piston to reduce the likelihood of rapid piston movements or oscillations.

Contrary to the Primary Examiner’s arguments, it should be appreciated that a sealing ring is not equivalent to a dampening ring. A dampening ring, and especially a wedge ring, inhibits “rolling” and provides a dampening force capable of reducing chattering, unlike the circular cross-section sealing rings described in Lai. Such lack of equivalence is discussed in detail in Greenwood et al. (see generally column 2, paragraph starting at line 48). Greenwood et al. discusses the difference between a sealing ring and a wedge ring. Although it is admitted that the sealing ring discussed in Greenwood et al. provides a resistive force, it does not provide a dampening force necessary to reduce chattering for the reasons discussed supra.

Lai does not disclose a springless reservoir or a dampening ring of any kind let alone a dampening wedge ring. Claims 1 and 17 are not anticipated by Lai for the reasons discussed *supra*. Claims 2-6, 8-12, 14, 16, 18-22, 24 and 25 dependent upon Claim 1 or Claim 17, enjoy the same distinction. Claims 2-6, 8-12, 14, 16, 18-22, 24 and 25 are allowable, upon which action is courteously requested.

A *prima facie* case of obviousness has not been established in regards to Claim 1 or Claim 17 since the prior art references (when combined) do not teach or suggest all the claim limitations. Furthermore, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

A combination of Lai and Greenwood et al. fails to describe all of the limitations common to independent Claims 1 and 17. Specifically, a combination of these references fails to describe the present invention’s operation on a principle of different pressures between the first

and second fluids, causing the piston to move from open or shut positions. Both Lai and Greenwood et al. teach the opening and closing of the piston by means of a pressure differential between a first fluid and a spring. Claims 1 and 17 are limited to springless reservoirs. If the spring in Lai or Greenwood et al. were removed, neither of the valves would operate and neither Lai nor Greenwood provides any teaching or suggestion to use an alternate to the disclosed spring let alone a specific suggestion to use a second fluid. This creates a very unlikely expectation of success and fails to meet the standard for an obviousness rejection. Thus, the combined Lai and Greenwood references fail to render Claim 1 obvious as they fail either to teach or suggest all the limitations of that claim. Applicants respectfully request reconsideration and allowance of Claims 1 and 17.

Claims 1 and 17 are not obvious over Lai in view of Greenwood et al. "If an independent claim is nonobvious under 35 U.S.C. §103, then any claim depending therefrom is nonobvious." *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). Thus, Claims 2-6, 8-12, 14, 16, 18-22, 24 and 25, depending from Claims 1 and 17 and thus incorporating all the respective limitations of Claims 1 and 17, are also not obvious. Claims 1-6, 8-12, 14, 16-22, 24 and 25 are allowable, upon which action is courteously requested.

Claims 1-6, 8-15, 17-22 and 25 rejected under 35 U.S.C. 102(e) as being anticipated by US Patent Number 6,978,799 (Kugelev et al.), or in the alternative, under 35 U.S.C. 103(a) as obvious over 6,978,799 (Kugelev et al.) in view of Greenwood et al. (US 3,913,885)

The Primary Examiner rejects Claims 1-6, 8-15, 17-22 and 25 under 35 U.S.C. 102(e) as being anticipated by US Patent Number 6,978,799 (Kugelev et al.). Applicants respectfully traverse the rejection. It should be appreciated that the Applicants are assuming the Primary Examiner intended the rejection to be an obviousness rejection of Kugelev et al in view of Greenwood et al. in action item 6 of the Final Office Action, and not Lai in view of Greenwood et al. as is recited in action item 6.

"A claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described in a single prior art reference." *Vandergaal Bros. v. Union Oil of California*, 814 F.2d 628, 631; 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). MPEP §2131. (Emphasis added). Each and every element of the claims is not found either expressly or

inherently described in Kugelev et al. The Primary Examiner states in item 6 of the Office Action of January 10, 2007 that Kugelev et al. disclose, “a dome reservoir (47) connected directly to said main valve body via said dome port”, but Claims 1 and 17 recite a dome reservoir that is external to the main valve body of the relief valve.

Additionally, Claims 1 and 17 recite to a dampening ring positioned circumferentially about the piston and operatively arranged to dampen the movement of the piston. Kugelev et al. fail to disclose a dampening ring operatively arranged to dampen the movement of a piston in a relief valve. Kugelev et al. teach “a delay fluid to delay a return of the valve member from the open position to the closed position... The pressure of the control fluid beneath the piston provides a delay force to the piston... As the pressure of the system fluid returns to an acceptable level, the fluid beneath the piston acts against the piston to delay the return of the piston to the closed position.” Kugelev et al. Column 3, lines 2-17. Kugelev et al. rely on the delay fluid system to reduce “chattering” and fail to disclose a dampening ring to reduce chattering. Seal 29 of Kugelev et al. “provides a sealing engagement between partition 27 and valve member 25” and provides no dampening force against the piston to reduce the likelihood of rapid piston movements or oscillations. Kugelev et al. Column 3, lines 57-59. Applicants courteously request the Primary Examiner’s attention to wear ring 313 of Figure 3 and paragraph [0013], wherein “[t]o prevent metal-to-metal contact and possible scoring between piston 60 and liner 58, wedge ring 312 and wear ring 313 are fit into shallow grooves in the piston that allow the outboard surface of each ring, and not the outside surface of the piston, to slide against the liner bore as the piston moves up and down” and to paragraph [0015], wherein “[p]iston seal 310, an elastomeric O-ring, provides the pressure- and leak-tight seal between piston 60 and liner 58. A PTFE back-up ring 311 is designed to give the O-ring support and prevent excessive deflection of the O-ring into the gap between metal parts 58 and 60.” Kugelev et al. disclose a sealing engagement by means of seal 29 and applicants disclose seals through ring 311 and ring 313, but applicants further disclose an additional ring, wedge ring 312, which provides means of dampening the movement of the piston to reduce the likelihood of rapid piston movements or oscillations.

Seal 29 does not provide any means of dampening the movement of the piston to reduce the likelihood of rapid piston movements or oscillations and provide only a “sealing

relationship”. Seal 29 in Kugelev et al. is arranged so as to provide minimal frictional contact between the piston and the bore. If seal 29 were to perform a dampening function to inhibit chattering, the elaborate fluid delay piston in the upper part of the valve body in Kugelev et al. would be superfluous. Furthermore, the sealing rings in Kugelev et al. have a circular cross sectional area, and although are not disposed in a wide-gap such as in Lai, fall victim to rolling and minimal surface contact as discussed *supra* with respect to the sealing rings in Lai. Seal 29, in both Kugelev et al. and the previous invention of Kugelev et al. (U.S. Patent No. 6,209,561) was unable to resolve the chattering problem by itself, necessitating the original fluid delay system described in U.S. 6,209,561 and the improved fluid delay system described in U.S. 6,978,799. Kugelev et al. was not able to solve the chatter problem for a springless pressure relief valve without an intricate and complicated fluid delay system in either of the inventions described in U.S. 6,209,561 or U.S. 6,978,799, thus seal 29 is not a dampening ring let alone a dampening wedge ring as disclosed in the claims of the present invention.

Kugelev et al. fail to anticipate each and every element of Claims 1 and 17. Claims 1 and 17 are allowable in view of Kugelev et al. Claims 2-6, 8-15, 18-22 and 25, dependent upon Claims 1 or 17, enjoy the same distinction. Claims 1-6, 8-15, 17-22 and 25 are allowable, upon which action is courteously requested.

A *prima facie* case of obviousness has not been established with regards to Claims 1 and 17 since the prior art references (when combined) fail to teach or suggest all the claim limitations. The references when combined, fail to teach or suggest the limitations of Claim 1: “said second fluid exerts a downward force on said piston, and said piston is arranged to move in response to a differential in said upward and downward forces”, and Claim 17: “exerting a downward force on said piston, wherein said downward force is generated solely by a second fluid in a dome reservoir connected to said relief valve, said dome reservoir is springless and external to a main valve body of said relief valve”. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Specifically, the present invention operates on a principle of different pressures between the first and second fluids, causing the piston to move from open or shut positions. The second fluid exerts only a downward force on the piston. Greenwood et al. teach the opening and closing of the piston by means of a pressure differential between a first fluid and a spring. If the spring in Greenwood et al. was removed, the valve would not operate. Kugelev et al. teach a second fluid exerting both an upward and downward force, a function of the second fluid that would render the present invention inoperable. There is no reasonable expectation of success and no suggestion to make the claimed combination.

Additionally, Kugelev et al. operates on a completely different principle of in comparison to Greenwood et al. Greenwood et al. describes operation in conjunction with a pilot valve. Kugelev et al. operates without a pilot valve, and instead has an automatic return system to return to a closed position with the assistance of the fluid delay system between the upper and lower piston chambers of Kugelev et al. Combining the inventions described in these two references would not only render a useless and needlessly elaborate pressure relief valve, it would also be is extremely unreasonable to do so. The motivation behind Kugelev et al. is to detract from spring-reliant relief valves and user-dependent pilot valves. The valve in Greenwood et al. is entirely dependent upon both of these structural features.

Claims 1 and 17 are not obvious over Kugelev, et al. in view of Greenwood et al. "If an independent claim is nonobvious under 35 U.S.C. §103, then any claim depending therefrom is nonobvious." *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). Claims 2-6 and 8-15 depend from Claim 1, and Claims 18-22 depend from Claim 17 and thus incorporate all the limitations of Claims 1 and 17, respectively. Because, as discussed above, the references fail to render obvious Claims 1 and 17, they also fail to render obvious Claims 2-6, 8-15 and 18-22. Claims 1-6, 8-15 and 17-22 are allowable, upon which action is courteously requested.

Claims 7 and 23 rejected under 35 U.S.C. 102(b) as being anticipated by Lai or, in the alternative, under 35 U.S.C 103(a) as obvious over the combination of Lai and Greenwood et al. in view of US Patent Number 5,174,326 (Steinert et al.)

The Primary Examiner rejects Claims 7 and 23 under 35 U.S.C. 102(b) as being anticipated by Lai (US 6,220,280) or, in the alternative, under 35 U.S.C 103(a) as obvious over

the combination of Lai (US 6,220,280) and Greenwood et al. in view of Steinert et al. (US 5,174,326). Applicants courteously traverse the rejection.

“A claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described in a single prior art reference.” *Vandergaal Bros. v. Union Oil of California*, 814 F.2d 628, 631; 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). MPEP §2131. (Emphasis added). Claims 7 and 23 depend from Claims 1 and 17, respectively, and thus incorporate all the elements of Claims 1 and 17. As discussed above, each and every element of the claims is not found either expressly or inherently described in Lai.

A *prima facie* case of obviousness is not established since the three basic criteria have not been met. First, the references lack suggestion or motivation, either by themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine reference teachings to include a dampening ring positioned circumferentially about the piston to reduce the likelihood of rapid piston oscillations. Second, there must be a reasonable expectation of success, and none of the sealing members or like components of the references offer a reasonable expectation of success or suggestion thereof that they will successfully dampen piston movement to reduce the likelihood of rapid piston oscillations. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations which they do not because they fail to teach or suggest a dampening ring positioned circumferentially about the piston to reduce the likelihood of rapid piston oscillations.

Claims 7 and 23 are not anticipated by Lai because Claims 7 and 23, dependant upon Claims 1 and 17, contain all of the same limitations as Claims 1 and 17. Claims 1 and 17 have been shown previously to not be anticipated by Lai. Similarly, Claims 7 and 23 are not obvious over the combination of Lai and Greenwood et al. in view of Steinert because Claims 7 and 23, dependant upon Claims 1 and 17, contain all of the same limitations as Claims 1 and 23. It would not have been obvious at the time the invention was made to a person having ordinary skill in the art to use a dampening ring positioned circumferentially about the piston to reduce rapid oscillations. Lai does not disclose any means of reducing rapid piston oscillations as previously shown including a dampening ring and Greenwood et al. is, *inter alia*, silent regarding pressure regulators.

Steinert is referenced by the Primary Examiner with regards to pressure regulation, but Steinert fails to describe piston movement or reducing rapid piston oscillations at all. Furthermore, there is no showing that the pressure regulator in Lai is suitable for maintaining a second fluid at a specified pressure in response to ambient temperature changes. Such a system may not be suited for the intended use in Lai since the first fluid in Lai may require, e.g., different pressures due to ambient temperature changes, but Lai is silent regarding any of these issues. It is inappropriate for the Primary Examiner to infer such conditions on the invention disclosed in Lai without an actual showing of such functional characteristics.

In addition to the reasons recited *supra*, Claims 7 and 23, dependent upon Claims 1 and 17, enjoy each and every distinction previously recited for Claims 1 and 17. Therefore, Claims 7 and 23 are allowable, upon which action is courteously requested.

Claims 7 and 23 rejected 35 U.S.C. 102(e) as being anticipated by Kugelev et al. (US 6,978,799) or, in the alternative, under 35 U.S.C 103(a) as obvious over the combination of Kugelev et al. (US 6,978,799) and Greenwood et al. in view of Steinert et al. (US 5,174,326)

The Primary Examiner rejects Claims 7 and 23 under 35 U.S.C. 102(e) as being anticipated by Kugelev et al. (US 6,978,799) or, in the alternative, under 35 U.S.C 103(a) as obvious over the combination of Kugelev et al. (US 6,978,799) and Greenwood et al. in view of Steinert et al. (US 5,174,326). Applicants courteously traverse the rejection.

“A claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described in a single prior art reference.” *Vandergaal Bros. v. Union Oil of California*, 814 F.2d 628, 631; 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). MPEP §2131. (Emphasis added). Claims 7 and 23 depend from Claims 1 and 17, respectively, and thus incorporate all the elements of Claims 1 and 17. As discussed above, each and every element of the claims is not found either expressly or inherently described in Kugelev.

A *prima facie* case of obviousness is not established since the three basic criteria have not been met. First, the references lack suggestion or motivation, either by themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine reference teachings to include a dampening ring positioned circumferentially about the piston to reduce the likelihood of rapid piston oscillations. Second, there must be a reasonable

expectation of success, and none of the sealing members or like components of the references offer a reasonable expectation of success or suggestion thereof that they will successfully dampen piston movement to reduce the likelihood of rapid piston oscillations. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations which they do not because they fail to teach or suggest a dampening ring positioned circumferentially about the piston to reduce the likelihood of rapid piston oscillations.

Claims 7 and 23 are not anticipated by Kugelev because Claims 7 and 23, dependant upon Claims 1 and 17, contain all of the same limitations as Claims 1 and 17. Claims 1 and 17 have been shown *supra* to not be anticipated by Kugelev. Similarly, Claim 7 is not obvious over Kugelev in view of Steinert because Claims 7 and 23, dependant upon Claims 1 and 23, contain all of the same limitations as Claims 1 and 17 and it wouldn't have been obvious at the time the invention was made to a person having ordinary skill in the art to use a dampening ring positioned circumferentially about the piston to reduce rapid oscillations in a springless reservoir valve having where the reservoir is external the main body of the valve. Kugelev, *inter alia*, does not have an external reservoir and Greenwood et al., *inter alia*, is a spring and pilot valve driven system.

Steinert is referenced by the Primary Examiner with regards to pressure regulation, but Steinert fails to describe piston movement or reducing rapid piston oscillations at all. Furthermore, there is no showing in Kugelev et al. is suitable for maintaining a second fluid at a specified pressure in response to ambient temperature changes. Such a system may not be suited for the intended use in Kugelev et al. since the first fluid in Kugelev et al. may require, e.g., different pressures due to ambient temperature changes, but Kugelev et al. is silent regarding any of these issues. It is inappropriate for the Primary Examiner to infer such conditions on the invention disclosed in Kugelev et al. without an actual showing of such functional characteristics. Furthermore, Steinert does not even discuss piston movement or reducing rapid piston oscillations.

Claims 7 and 23, dependent upon Claims 1 and 17, enjoy each and every distinction previously recited for Claims 1 and 17. Therefore, Claims 7 and 23 are allowable, upon which action is courteously requested.

Claim 26 rejected under 35 U.S.C. 103(a) as obvious over Lai or the combination of Lai and Greenwood et al. as set forth above and further in view of Geffroy (US 3,917,290) or Doose (US 4,580,790) or Scarlett (US 6,428,014)

A *prima facie* case of obviousness has not been established in regards to Claim 1 since the prior art references (when combined) do not teach or suggest all the claim limitations. In addition to the reasons discussed *supra*, Geffroy, Doose and Scarlett (only cited in regards to material selection) are silent regarding the structural elements of a pressure relief valve beyond sealing rings. Thus, the references fail to teach or suggest all the claim limitations, specifically, *inter alia*, a springless reservoir. Claim 1 is allowable. Claim 26, dependent upon Claim 1, enjoys each and every distinction previously recited for Claim 1. Therefore, Claim 26 is allowable, upon which action is courteously requested.

Claim 26 rejected under 35 U.S.C. 103(a) as obvious over Kugelev or the combination of Kugelev and Greenwood et al. as set forth above and further in view of Geffroy (US 3,917,290) or Doose (US 4,580,790) or Scarlett (US 6,428,014)

A *prima facie* case of obviousness has not been established in regards to Claim 1 since the prior art references (when combined) do not teach or suggest all the claim limitations. In addition to the reasons discussed *supra*, Geffroy, Doose and Scarlett (only cited in regards to material selection) are silent regarding the structural elements of a pressure relief valve beyond sealing rings. Thus, the references fail to teach or suggest all the claim limitations, specifically, *inter alia*, an external reservoir. Claim 1 is allowable. Claim 26, dependent upon Claim 1, enjoys each and every distinction previously recited for Claim 1. Therefore, Claim 26 is allowable, upon which action is courteously requested.

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Conclusion

Applicants respectfully submit that all pending claims are now in condition for allowance, which action is courteously requested.

Respectfully submitted,

A handwritten signature in cursive script, reading "C. Richard Lohrman".

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